WHAT IS CLAIMED IS:

1. A method of binary coded data communication, the method comprising the steps of:

providing a transmitter having an outer code encoder and interleaver, and further having an inner coded encoder selected from the group consisting of (a trellis coded modulator (TCM) and a turbo trellis coded modulator (TTCM) encoder), a constellation shaping element, and a mapping element;

processing a desired binary coded input bit stream via at least the outer code encoder and interleaver to provide a desired inner bit stream; and

processing the desired inner bit stream via at least the inner encoder and the mapping element to generate a plurality of N symbols.

2. The method of binary coded data communication according to claim 1 wherein the step of processing the desired inner bit stream comprises the steps of:

partitioning the desired inner bit stream into a first binary coded bit stream having K-bits, a second binary coded bit stream having N*k-bits, (where k complies with a rate k/n inner code), and a third binary coded bit stream having the remaining bits;

processing the second binary coded bit stream via the inner encoder to generate a code selected from the group consisting of (a TTCM code and a TCM code);

processing the first binary coded bit stream via the constellation shaping element to generate N shells; and

mapping the selected code, the N shells, and the remaining bits via the mapping element to generate the plurality of N symbols, wherein the remaining bits are operational to select between multiple cosets within each shell.

3. The method according to claim 2 further comprising the steps of:

providing a receiver having an inner code decoder and constellation shaping elements; and

processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired input bit stream.

4. The method according to claim 3 wherein the step of processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired input bit stream comprises the step of receiving the plurality of symbols via a transmission medium and processing the plurality of symbols via a decoder selected from the group consisting of a Viterbi decoder and a turbo decoder to generate a number of hard symbols.

5. The method according to claim 4 wherein the step of processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired input bit stream further comprises the steps of:

processing the number of hard symbols via a shell de-mapper to generate a binary coded bit stream having K-bits; and

processing the number of hard symbols via a symbols-to-bits mapper to generate a binary coded bit stream having the rest of the bits.

6. The method according to claim 5 wherein the step of processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired input bit stream comprises the step of processing the binary coded bit stream having K-bits and the binary coded bit stream having the rest of the bits via a de-interleaver and RS-decoder to estimate the desired input bit stream.

7. The method according to claim 2 further comprising the step of processing the mapped code, the mapped N shells, and the mapped remaining bits via a Laroia precoder prior to generating the plurality of symbols.

8. The method of binary coded data communication according to claim 1 wherein the step of processing a desired binary input bit stream comprises the steps of:

partitioning every block of the desired binary input bit stream into a first binary coded bit stream having K-bits and a second binary coded bit stream having N*b'-K bits;

processing the first binary coded bit stream via a shell mapper to generate N shells represented by a third binary coded bit stream;

combining the third binary coded bit stream and the second binary coded bit stream via a combinational element to generate the desired binary coded input bit stream; and

processing the desired binary coded input bit stream via the outer code encoder and interleaver to provide the desired inner bit stream.

9. The method of binary coded data communication according to claim 8 wherein the step of processing the desired inner bit stream comprises the steps of:

partitioning the desired inner bit stream into a first inner binary coded bit stream representing N shells, a second inner binary coded bit stream having N*k bits, and a third inner binary coded bit stream having the remaining bits;

processing the second inner binary coded bit stream via the inner encoder to generate a code selected from the group consisting of (a TTCM code and a TCM code); and

mapping the selected code, the N shells, and the remaining bits via the mapping element to generate the plurality of N symbols, wherein the first inner binary coded bit stream is operational to select shells for each symbol, the selected code is operational to select a coset within a shell, and the remaining bits are operational to select between multiple cosets within each shell.

10. The method according to claim 9 further comprising the step of processing the mapped code, the mapped N shells, and the mapped remaining bits via a Laroia precoder prior to generating the plurality of symbols.

11. The method according to claim 9 further comprising the steps of:

providing a receiver having an inner code decoder and constellation shaping elements; and

processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired binary coded input bit stream.

12. The method according to claim 11 wherein the step of processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired binary coded input bit stream comprises the step of receiving the plurality of symbols via a transmission medium and processing the plurality of symbols via a decoder selected from the group consisting of a Viterbi decoder and a turbo decoder to generate a number of hard symbols.

13. The method according to claim 12 wherein the step of processing the plurality of symbols via the inner code decoder and the receiver constellation shaping elements to estimate the desired binary coded input bit stream further comprises the steps of:

processing the number of hard symbols via a symbols-to-bits mapper, a de-interleaver and RS-decoder, to generate a binary coded interleaved bit stream;

partitioning the binary coded interleaved bit stream into a first part representing a number (N) of shells, and a second part having the rest of the bits;

processing the N shells via a shell de-mapper to generate a binary coded output bit stream having K-bits; and

combining the output bit stream and the rest of the bits via a combinational element to estimate the desired binary coded input bit stream and there from recover the input bit stream.

14. A binary coded data communication system comprising:

a transmitter having an outer code encoder and interleaver, an inner code encoder element selected from the group consisting of (a turbo trellis coded modulator (TTCM) and a trellis coded modulator (TCM)), a constellation shaping element, and a mapping element; and

a receiver having an inner code decoder, constellation shaping elements, and an outer code decoder, wherein the transmitter mapping element is operational to generate a plurality of symbols in response to a plurality of bit streams that are generated via the inner encoder and transmitter constellation shaping element in response to a partitioned bit sequence that is generated by the outer code encoder and interleaver, and further wherein the receiver is operational to receive the plurality of symbols over a transmission medium and there from estimate the partitioned bit sequence via the receiver inner code decoder, receiver constellation shaping elements, and outer code decoder, such that a non-partitioned bit sequence can be recovered.

15. The binary coded data communication system according to claim 14 wherein the transmitter and receiver constellation shaping elements comprise shell mapping elements.

16. The binary coded data communication system according to claim 15 wherein the transmitter further comprises a Laroia precoder operational to condition signals generated via the transmitter mapping element prior to generation of the plurality of symbols by the transmitter mapping element.

17. The method of binary coded data communication according to claim 1 wherein the step of generating a plurality of symbols comprises the step of generating a signal constellation having shaping regions capable of use in association with shell mapping that is compatible with rate k/n coded modulation selected from the group consisting of trellis coded modulation (TCM) and turbo-trellis coded modulation (TTCM).

18. The method of binary coded data communication according to claim 1 wherein the step of processing the desired inner bit stream comprises the steps of:

partitioning the desired inner bit stream into a first binary coded bit stream having K-bits, a second binary coded bit stream having N*k-bits, (where k complies with a rate k/n inner code), and a third binary coded bit stream having the remaining bits;

processing the second binary coded bit stream via the inner encoder to generate a code selected from the group consisting of (a TTCM code and a TCM code);

processing the first binary coded bit stream via the constellation shaping element to generate N shells; and

mapping the selected code, the N shells, and the remaining bits via the mapping element to generate the plurality of N symbols, wherein the remaining bits are operational to select between multiple cosets within each shell;

and wherein the interleaver used in association with the outer code is such that the K bits of the first binary coded bit stream result from several codewords of the outer code.